Wireless E-Notice Board

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Abstract*: Notice boards are one of the major communication mediums for mass media. Many Universities and educational institutions still use wooden notice board to display announcements. However, reliance on such boards is still not enough to convey relevant information around the organization. This paper gives a basic idea about Wireless E-Notice Board. Primary aim of the proposed system is to ensure that information sent from a remote place is displayed on display unit. The Wireless E-Notice board uses the GSM technology to display the message send through an SMS via mobile phone from a remote location on a larger display unit such as LCD monitor. Also, multiple users can send message at a time, which in case, would be displayed on the basis of their priority. Allregistered users would be notified about the message being displayed.This paper deals about an advanced hi-tech wireless notice board.*

Keywords*: E-Notice Board, Wireless, SMS, SIM300GSM modem, Raspberry Pi B+, Large Display.*

I. Introduction

A Notice Board is a place where people can leave messages to advertise things to buy or sell, announce events, or provide information.[7] Sending SMS through mobile phone has become very popular and if we can use this to control various devices and in displaying data. It is possible to receive or decode the SMS throughout globe by using GSM, by any part of the world we can control and display data on LCD monitor. This paper deals about an advanced hi-tech wireless notice board.[5]

Wireless E-Notice board is project that aims for displaying the textual message on a larger display unit like LCD(Liquid Crystal Display) monitor.The main aim of the systemis to design a SMS driven notice board, which can replace the currently used electronic display. It is proposed to design display toolkit which can be usedfrom an authorised mobile phone. It presents an SMS based notice board using the widely used GSM to facilitate the displaying of message on notice board through user's mobile phone. Its operation is based on Raspberry Pi programmed in Python programming language. A SIM300 GSM modem with a SIM card is interfaced to the serial communication GPIO pins of Raspberry pi with the help of Python script. The SMS sent via registered number from mobile phone, is received by SIM300 GSM modem, which is duly interfaced to the Raspberry Pi. The messaged is thus fetched into the Raspberry Pi. This message is further displayed in a LCD display, which is connected to Raspberry Pi using HDMI(High Definition Multimedia Interface) cable. The messages would be displayed for a predefined time. Also, displaying of the message would be on the basis of priority that would be assigned to each sender in case of multiple senders. The system uses a LCD monitor for larger display of the message send via SMS, thus increasing the reachability of notice board.
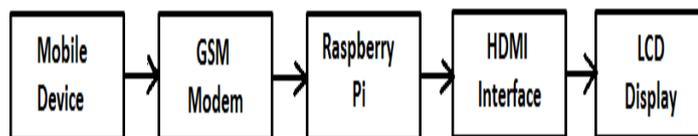
Figure 1: Block diagram of proposed system

II. Literature Review

Notice boards are best for using at home, at work, in school and in catering related businesses such as pubs and restaurants. They,being useful also look great as well. There are so many types available.Felt Notice Boards-They can come in no end of colours.Cork Notice Boards-Cork notice boards are very similar to felt notice boards but without the cover.Magnetic Notice Boards-Magnetic notice boards are great fun. You can buy a variety of different magnets for customisation of board. One of the more popular magnetic notice boards is the football board.[6]

And then came the digital notice boards, which were further improvised by using wireless technologies. Wireless E-Notice board using GSM used ATMEGA microcontroller and 16X2 LED display-to-displaymessage [8]. Further E-notice board was developed as a web application which could be viewed from anywhere and at any time.[9]

GSM technology is widely used whether it is calling or other SMS based projects like GSM based Data Acquisition system[11],SMS based teaching and learning system[12],Multiple units GSM controlled devices[13].

The Raspberry Pi is a series of credit card–sized single-board computers developedby the Raspberry Pi Foundation in England, United Kingdom with the intention of promoting the teaching of basic computer science in schools and developing countries.All Raspberry Pi include the same VideoCore IV Graphics Processing Unit (GPU), andone of single-core ARMv6-compatible CPU or newer ARMv7-compatible quad-core one(in Pi 2). Pi 2 has 1GB of RAM while Pi 1 models B and B+ have 512 MB andmodels A and A+ have 256 MB.The Raspberry Pi Foundation, in 2014, launched the Compute Module, to be used as a part of embedded systems for the same compute power as the original Pi. In February 2015, the next-generation of Raspberry Pi, Raspberry Pi 2, was released.[4]

III. Existing System

The existing system uses GSM module and microcontroller for displaying text messages on 16x2/32x4 LED display. The Existing system has at least three circuits interfaced, MAX-232 with Microcontroller, LCD display with microcontroller, and MAX-232 with GSM MODEM.
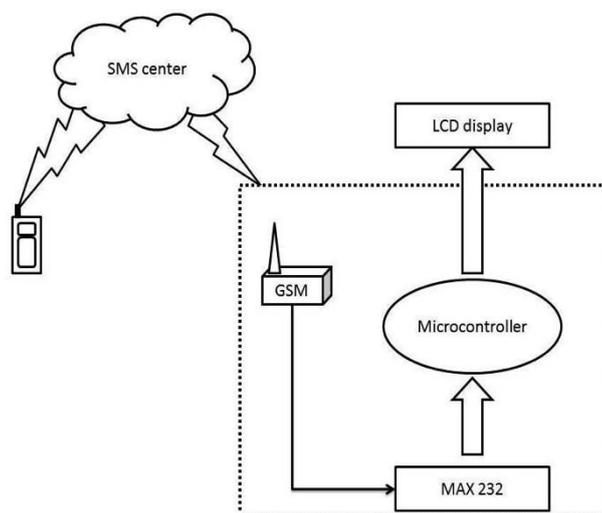
Figure 2: architecture of Existing system

Interfacing a MODEM with a normal computer is quite easy with the help of the AT commands sent to it from the Hyper Terminal window. But the MODEM requires a wired connection at one end and wireless at the other. Ageneral purpose computer placed at each and every site of the display boards makes the task a lot easier but is too expensive. Hence Atmel 89S52 microcontroller is used with 64 Kb EEPROM storage memories. The complexity of coding substantially increases.[10]

A. Disadvantages Of Existing System
Some limitations of existing system are as follows:
1) Poor Reachability- As the existing system has an on-board display, that is, LCD display is much smaller, there is barrier on the number of people who can read the message that is being displayed on it thus, reducing the reachability of notice board. This the major problem with the existing system
2) Unable to display long messages- Apart from being small, there is also restriction on number of characters and lines to be displayed on LCD display. Thus, longer messages consisting of large number of lines could not be displayed on on-board display.
3) Complex Circuit- GSM modem can easily be interfaced with normal computers but in order to interface it with microcontroller we require a MAX232 level shifter which increases the complexity of circuit.[1]
    The proposed Systemovercomes all the limitations in the best possible way.

A. PROBLEM STATEMENT OF PROPOSED SYSTEM

Display units of notice board must be larger in size because smaller, onboard, displays have limited usability as well as reachability. This system mainly focuses on displaying the text messages, sent from remote location using mobile phone, on larger display unit like LCD monitor thus increasing the reach of the notice board. Professor/user can send the required information and notices from remote locations. Also notifications regarding the SMS will also be sent.

IV.   Proposed System
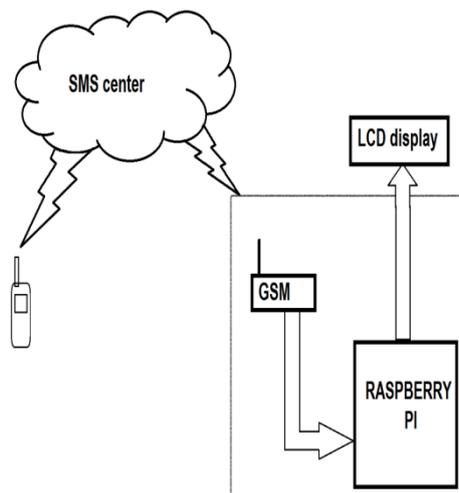
Figure 3: Architecture of proposed system

The user sends message as an SMS to the Mobile Identification Number (MIN) of the SIM card used in GSM modem. GSM modem using the SIM card receives message transmitted from any number to this MIN. GSM modem uses AT commands for its working. It is interfaced to Raspberry Pi(model B+) by connecting TXD and RXD of GSM modem to RXD and TXD of raspberry pi respectively. Owing to this connection the message is transmitted through serial port. TXD and RXD pins of raspberry pi are 8th and 10th pins respectively of the 40 GPIO(General Purpose Input Output) pins(for model B+).The message received by GSM modem is fetched by raspberry pi using appropriate AT commands. Raspberry Pi is duly interfaced with LCD monitor using HDMIcable. The message thus received is displayed on LCD monitor. This message is displayed for a pre-defined time period. After the timeout a default message or image is displayed until a new message is received. In case of reception of multiple messages simultaneously, message of the user with highest priority(which is pre-assigned) would be displayed first. All the other users would be notified about the message being displayed via SMS.

B. COMPONENTS FOR PROPOSED SYSTEM:

1) MOBILE PHONE:
   A mobile phone is a device that is used to make as well as receive telephone calls.
2) GSM MODEM:
   The modem we are using is SIMCOM SIM300. It is a Tri-band GSM/GPRS Modem. Default operating frequencies are 900MHz and 1800MHz.[2]
3) RASPBERRY PI:
   The Raspberry Pi B+ computer board has Broadcom BCM2835 (CPU & GPU),512MB RAM, 4USB2.0 Ports,HDMI, Audio, SD Card Slot, Micro USB for power.[3]
4) HDMI INTERFACE:
   HDMI (High-Definition Multimedia Interface) is audio/video interface for transferring uncompressed or compressed data from an HDMI-compliant source device. [4]
   5) LCD MONITOR:
   Liquid-crystal-display (TV) are television sets that use LCD display technology to produce images.[4]
6) SIM:
   The SIM is a detachable smart card containing the user's subscription information and phone book.[4]

C. WORKING OF PROPOSED SYSTEM:

The entire system is divided into two sections: Transmitting and Receiving.Transmitting section consists of a mobile device. Any type of user (SIM number) can be used.Users whose numbers are predefined in the program can only have access to the LCD display.Receiving section on the other hand consists of a GSM modem to receive message.

Stepwise implementation of the proposed system is as follows:

Step 1: Authorized users send the message that are needed to be displayed on the notice board to the receiving section's SIM number

Step 2: GSM modem, at the receiving section, receives the message.

Step 3: The AT commands are serially transferred to the modem.

Step 4: In return the modem transmits the stored message through the serial port

Step 5: Received SMS are then sent to Raspberry Pi processor.

Step 6: Raspberry Pi finally displays it on LCD display and the message will be displayed only if the users are authenticated.

V.   Advantages

1) Text can be entered from remote place- The use of GSM technology enables the user to send message from any part of the world, which would be received by modem and eventually be displayed on LCD
2) Reduces human effort- Since it is an automated system minimum human intervention is required after programming the circuit.
3) Saves Paper- Being completely electronic, the notice board does not use any kind of paper. Thus reducing utilization of paper.
4) No need of complex circuit- All the connections and interfacing can be done easily and does not require any complex apparatus.
5) User-friendly- Since the system is easy to operate it does not require any special expertise or skills.

VI.   Applications

This system has applications in various private as well as public sector.
1) Some of the important applications are:
*   Railway station
*   Institutional use
*   Hospital
*   Bus station
2) This system can be used in colleges and organizations.
3) In Metropolitan cities to manage traffic.
4) Information on criminals run.

VII.   Conclusion

The display boards are one of the most important media for transferring information to the maximum number of end users. With the advancement in technology the display board systems are migrating from normal hand written display to digital display. Further to Wireless display units. The concept of this system is to introduce a new technology for notice board display system using GSM technology. A user can send a message from anywhere in the world.

This paper deals with development ofa GSM modem connected wireless notice board system, which displays the desired message of the user through an SMS in most populated or crowded places or remote places. Thisproposed system has many remarkable applications in educational institutions and organizations, traffic management, crime prevention, railways, advertisements etc. Being user friendly, long range and speedy means of conveying information are major characteristics of this system. By using this proposedideology we can improve the security system and also make awareness of the emergency situations and avoid many dangers. In general, Wireless E-notice board will prove to be an improvement over the existing notice boards used in college campus.

VIII.   Future Scope

Temperature display during periods wherein no message is in memory is one improvement that is well possible. Another very innovative and significant improvement would be to accommodate multiple receiver MODEMS at different positions scattered across large geographical areas and carrying duplicate SIM cards. Another added variation in the system can bemultilingualdisplay.

This feature can be included by programming the microcontroller (here which is Raspberry Pi) to use different schemes of encoding and decoding in different areas as per the local language. This will ensure that there is an increase in the number of informed users. We can also consider Graphical display as a long term but

achievable output. MMS technology along with relatively powerful microcontrollers can be used to carry on the tasks. In our system we are sending messages via GSM network through air interface and displaying it on a LCD by using AT commands. The same principle can be used to control electrical appliances at a distant location.

Our same concept can be used to display the image files or PDF's with the use of better wireless technologies than GSM like Bluetooth or Wi-Fi systems with better extended memories.

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